KOLLMORGEN

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High frequency inverter
ACO5000 by ACOMEL

USER MANUAL

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CAUTION

DO NOT INSTALL THE WINDOW PROGRAMMING SOFTWARE BEFORE TO INSTALL THE USB PORT CONNECTION AND DRIVER.

FOLLOW THE INSTRUCTION OF THE INSTALLATION CARD DELIVERED WITH THE WINDOWS SOFTWARE.

Safety instructions

Information on the Operating Manual

This operating manual applies to the ACO5000 frequency inverter family. It describes the connections and basic functions of the standard models.

CAUTION! Danger of death by electrocution

CAUTION! Absolutely essential

Be careful! Incorrect operation, may lead to damage.

The Basic Safety Rules

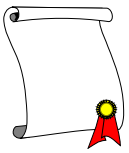
First read the user manual

Before installing and commissioning, it is important for such personal to read carefully the operating instructions and safety warnings.

Electric drives are potentially dangerous

- Electrical voltages > 230 V/460 V
- High voltages may still be present up to 5 minutes after the power has been cut off. Therefore you must always check for presence of power and voltages!
- In STOP mode, the drive remains active and the motor terminals are at a potential of 300 VDC against the ground.
- Rotating parts
- Hot surfaces

Your qualification



- In order to prevent personal injury and damage to property, only personnel with electrical engineering qualifications may work on the device.
- The person must be familiar with the user manual.
- Have knowledge of national standards and accident prevention regulations

Working instruction

During installation observe the following instructions:

- Always comply with the suggested connecting diagram and technical specifications.
- Comply with the standards for electrical installations, such as regarding wire gauges, grounding lead and ground connections.
- **Without prior writing agreement** you are not allowed to open the drive. If you do it, the warranty will be void.

Over speed protection

If an application required an over speed protection, it must be provided by the motor manufacturer, as this function is not integrated in the drive.

Overload protection

The drive doesn't integrate any input line overload protection. An external overload protection is required for the AC main and the supplied 24 VDC.

Proper installation

Inverter drives are components that are intended for installation within electrical systems or machines. The inverter may not be commissioned or put into operation until it has been established that the machine as a unit complies with the provisions of the EC Machinery Directive (98/37/EC) as well with the standard EN 60204-1998 (Safety of machines).

For the drive connection please refer to the schematics and instructions included in this manual (see chapter “The start option”)

If the frequency inverter is used for special applications the specific standards and regulations for this environment must always be observed.

Repairs may only be carried out by authorized repair workshops. Unauthorized opening and incorrect intervention could lead to physical injury or material damage. The warranty provided by DANAHER-MOTION would thereby be void.

If you have to do it, bear in mind that the converter control board uses a large number of MOS (Metal Oxide Semiconductor), which are highly sensitive to electrostatic charge.

To avoid any damages to the control board:

- Make sure you are working on an earthen anti-static floor or being properly earthed.
- use anti-static packing material only

Responsibility

Electronic devices are fundamentally not fail-safe. The company setting up and/or operating the machine or plant is itself responsible for ensuring that the machine is rendered safe if the drive fails.

Programming of the drive

The drive is programmed using windows based software. The details of the programming and setup are described in the manual S620_GB_xx. Programming software, drivers and the programming manual are included on CD-rom supplied with this documentation.

Product description

Highlights

- PAM – Pulse Amplitude Modulation – a technology with regulated intermediate DC bus
- Traditional ACOMEL SHS – Selective Harmonic Suppression – modulation
- Windows based programming software
- Can be operated via Terminal Block, dedicated terminal TL5 or Profibus
- Large number of free programmable parameters
- 32 complete sets of motor parameters can be stored and selected
- CE and UL (pending)

Power supply module

- Input voltage 200 – 480 VAC, +10% / -15%, 50/60 Hz, auto-ranging
- DC power output max. 36 A for the ACO5000A
- DC power output max. 45 A for the ACO5030A
- Power IN connect to the bottom
- Integrated dynamic braking resistor, 830 Ω / 100W (1000 W peak)
- Possibility to add an external braking resistor module
- 24 VDC, auxiliary power input supplied by customer, 2 to 4 A depending of the number of axis
- USB port, internally interconnected to the drive(s)
- RS485 port dedicated to remote KeyPad TL5
- Article designation: ACO5000A

External braking resistor module

- Same dimensions as the power supply module
- Internal connection to the power supply module
- Used when full braking power is required
- Rating 22 Ω / 1200 W (5 kW peak)
- Article designation: ACO5000R for the basic version
- Article designation: ACO5000R1 for version with fan cooling for improved performances.

Power Drive module

- Internal connections to the power supply module
- Motor power OUT and PTC input connect to the bottom
- Pluggable screw terminals – see "Control terminals description"
- Safety relay with feed back info to the CNC or PLC
    - Standard: the free potential contact CLOSED when the relay is enabled (contact NO)
    - Option –C: the free potential contact OPENS when the relay is enabled (contact NC)
- All "Control terminals" are opto-insulated
- PROFIBUS port (Option)
- Sensor feedback connector (not compulsory to drive a motor)
- 7 segments status display
- 5 power ratings: 5, 8, 12, 20 and 30 A, 3 physical sizes
- Max output frequency 5000 Hz
- Article designation: ACO50xxD (see "Power ratings" table)

Power ratings

Drive	Nominal current	Peak current	Max output Power @ 230 V	Max. Output Power @ 400 VAC	Max. power dissipation
ACO5005D	5 A	7.5 A	3 kVA	5 kVA	200 W
ACO5008D	8 A	12 A	5 kVA	8 kVA	320 W
ACO5012D	12 A	18 A	7 kVA	12 kVA	480 W
ACO5020D	20 A	30 A	12 kVA	20 kVA	800 W
ACO5030D	30 A	45 A	18 kVA	30 kVA	1200 W

General technical data

	Unit	Comment
Output frequency step	Hz	≤ ± 0.5% of the set frequency
Type of load		Resistive / Inductive
Short-circuit protection between phases		At terminals
Ground short-circuit protection		At power ON and at terminals
Efficiency at nominal load	%	96
Max. ambient temperature	°C	40
Output power derating relative to the operating altitude		> 1000 m, derating of 5% per 1000 m. Max. operating altitude 2000 m – derating 10%
Output power derating relative to the operating ambient temperature	%/°C	3% / °C over the ambient of 40°C Max. ambient temperature 50° C
Relative humidity	%	15 … 85 not condensing
Storage temperature	°C	-25 to +55 according VDE0160
Shipping temperature	°C	-25 to +70 according VDE0160

Examples of product configuration and weight

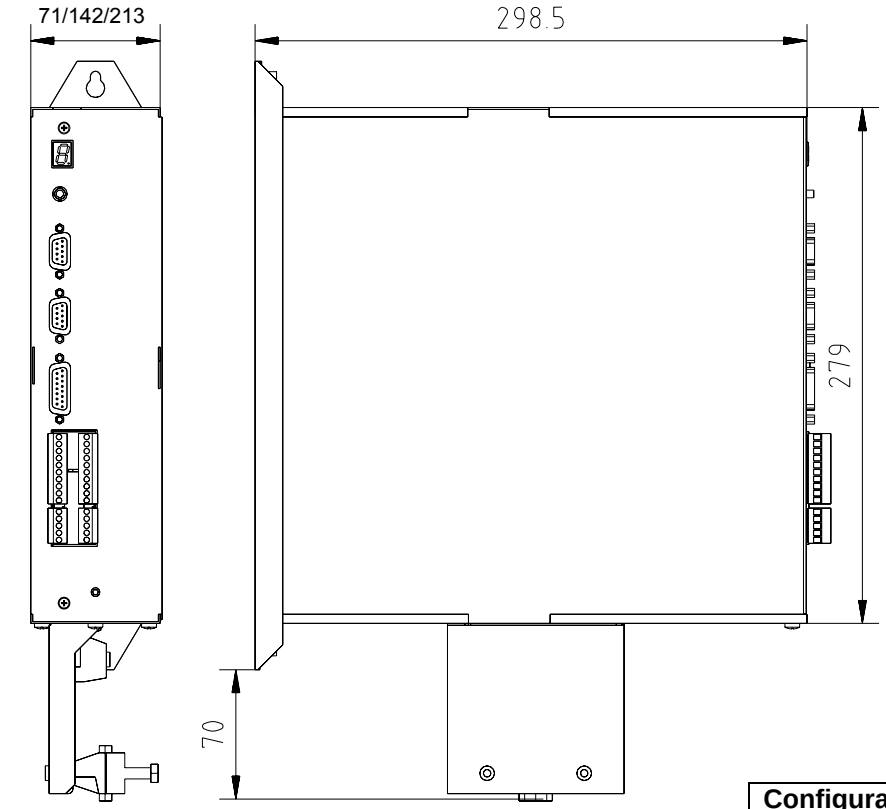
Designation	ACO 5000A 5030A	ACO 5005D	ACO 5008D	ACO 5012D	ACO 5020D	ACO 5030D	ACO 5000R 5000R1	Size	Weight kg
SINGLE AXIS									
ACO5-0005T	1	1						2	11.5
ACO5-0005R	1	1					1	3	13.8
ACO5-0008T	1		1					2	11.5
ACO5-0008R	1		1				1	3	13.8
ACO5-0012T	1			1				3	18.6
ACO5-0012R	1			1			1	4	20.7
ACO5-0020T	1				1			3	18.6
ACO5-0020R	1				1		1	4	20.7
ACO5-0030R1	1					1	1	5	31.7
MULTI-AXIS									
ACO5-0055T	1	2						3	16.9
ACO5-0055R	1	2					1	4	19.2
ACO5-0085T	1	1	1					3	16.9
ACO5-5555T	1	4						5	27.6
ACO5-5555R	1	4					1	6	29.9
ACO5-0888R	1		3				1	5	24.5
ACO5-1255T	1	2		1				5	26.7
ACO5-1285R	1	1	1	1			1	6	29.0
ACO5-1212R	1			2			1	6	33.3

Any configuration up to size 6 (6 modules units) so far at any time, the sum of the currents doesn't exceed 36A as peak power. Any configuration exceeding the max. is not allowed, the power supply being not protected for overload. Only the drive(s) integrated a current limitation and an overload protection. No multi-axis configuration allowed with the ACO5030A and ACO5030D

The configurations with external braking resistor module can be made using the ACO5000R or ACO5000R1, except for the ACO5030R1 where the module with additional fan cooling is mandatory.

Mounting and installation

Mechanical dimensions

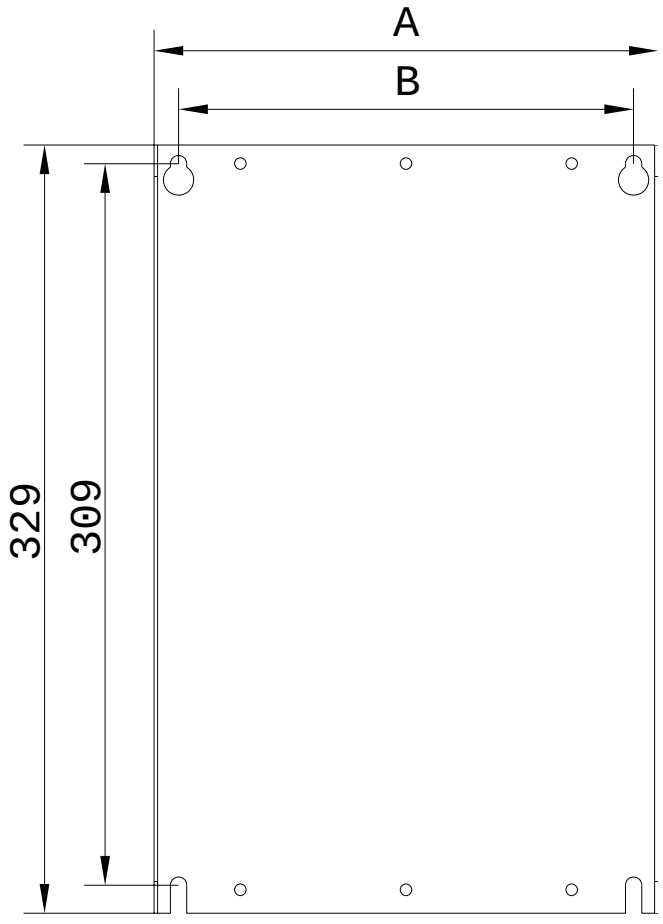


Module dimensions

- ACO5000A
- ACO5000R
- ACO5005D
- ACO5008D
  - **Width 71 mm**

- ACO5012D
- ACO5020D
  - **Width 142 mm**
- ACO5030D
  - **Width 213 mm**

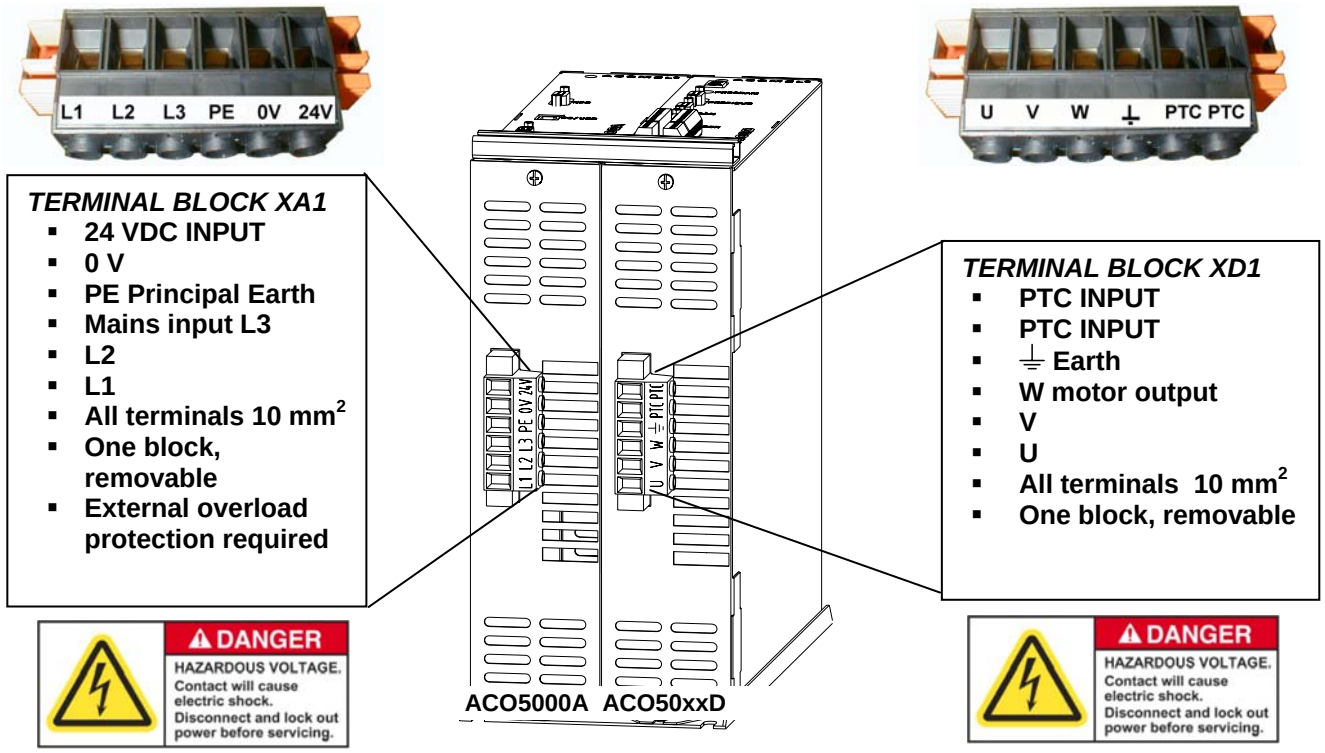
- **Mounting position vertical**
- **Cabinet integration: For proper cooling leave 10 cm free space on top of the inverter.**



Configuration	A	B
"**2 modules unit**" made of: ▪ 1 ACO5000A ▪ 1 ACO5005D / 08D	145	124
"**3 modules unit**" made of: ▪ one of the above and 1 ACO5000R, or 1 ACO5000A and 2 ACO5005D / 08D, or 1 ACO5000A, and 1 ACO5012D / 20D	216	195
"**4 modules unit**" made of: ▪ any combination of 1 ACO5000A, drive(s) ACO50xxD and/or 1 ACO5000R (R1)	287	266
"**5 modules unit**" made of: ▪ any combination of 1 ACO5000A, drive(s) ACO50xxD and/or 1 ACO5000R (R1)	358	337
"**6 modules unit**" made of: ▪ any combination of 1 ACO5000A, drive(s) ACO50xxD and/or 1 ACO5000R	429	408
Mounting screws: 4 x M6		
NOTE: At any time, the sum of the current of any drive combination must not exceed 36A (45A) as peak power.		

Description and connection

Power terminals



Specifications of the input terminal block XA1

- AC line
  - Input voltage
    - min. 200 V single phase –15%
    - max. 3 phases 480 V
    - 50 / 60 Hz
  - Single phase input connect to any 2 of L1, L2 or L3
  - External overload protection required.
    - Circuit breaker or line fuses max. 32 AT
  - Use copper conductors 75°C

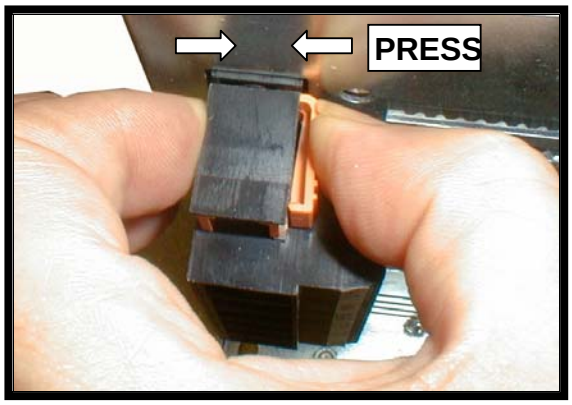
- 24 VDC external power supply
  - Voltage tolerances ±10%
  - Required power min. 1 A per module up to ACO5020 and 3A min. for ACO5030R1
  - External overload protection required if not short-circuit proof

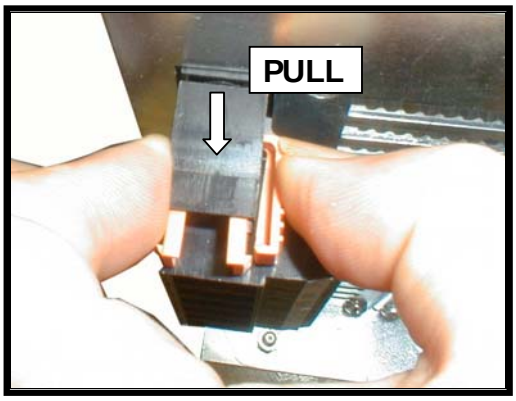
Specification of the output terminal block XD1

- Motor power
  - Max. output voltage 3 phases 480 V, 5000 Hz
  - Use power cable according to the recommendation of the motor manufacturer
  - Cable gauge according the motor current requirements

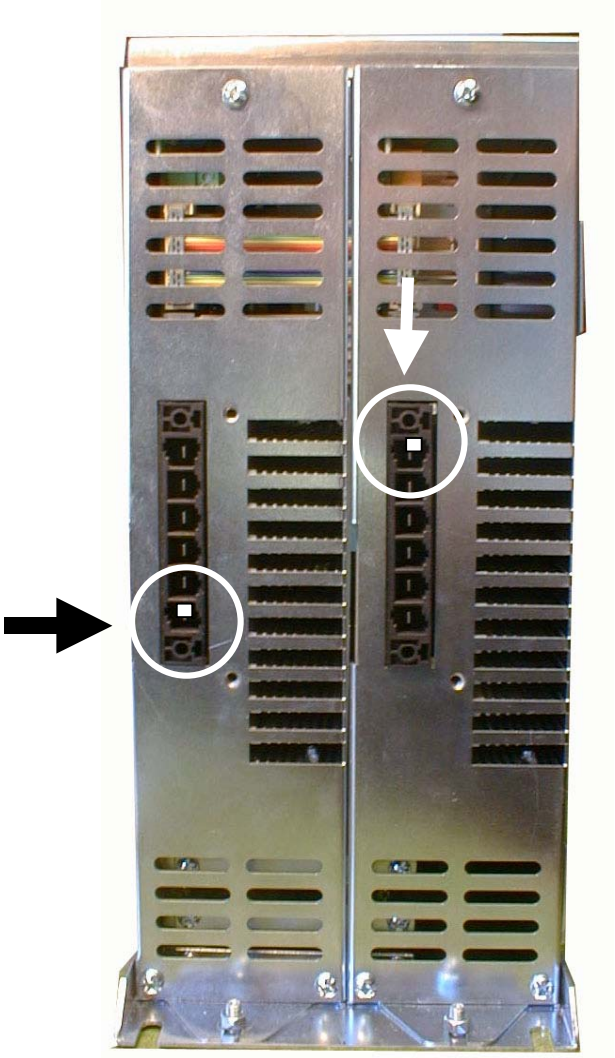
- PTC input
  - This input is over voltage proof up to 500 VAC
  - In case of use of temperature sensor, program the appropriate input calibration.

How to unlock the power terminals



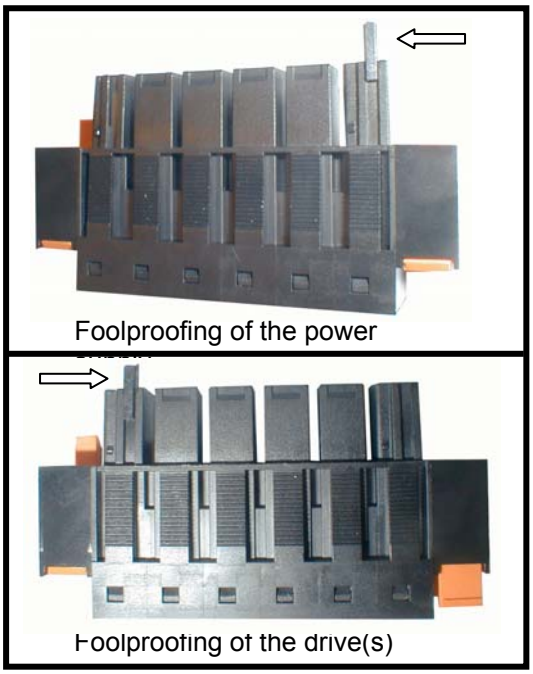


Power terminal foolproofing



Power supply **Driver**

To avoid the risk of inverting the connectors of the power supply and the drive(s), both connectors are coded. The pictures show the coding position (white square) and the way to insert the coding tag (the right pictures show a half inserted tag).



Foolproofing of the power

Foolproofing of the drive(s)

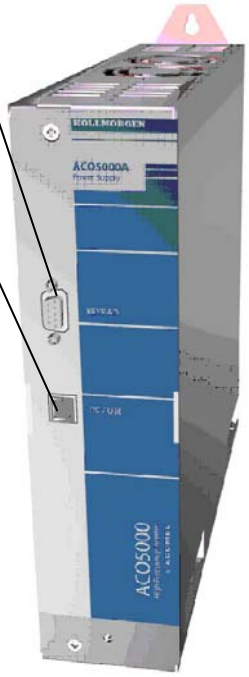
Front panel description

Power supply module

D-sub 9 poles connector for the specific user interface TL5

USB Port dedicated as service port to:
- ❑ Program the drive(s)
- ❑ Up-date the firmware
- ❑ Commission the installation
- ❑ Testing and debugging
- ❑ Internally connected to the drive(s)

Note: Not to be used to operate the equipment in production.



Power Drive module

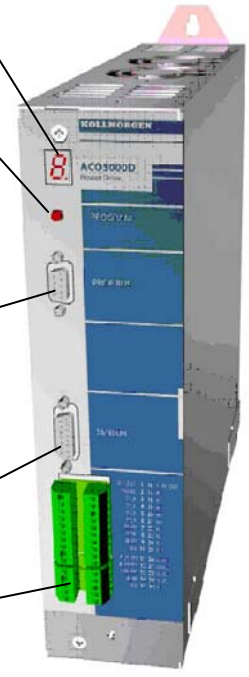
7-segments display shows the current status of drive, used as fault indicator too.

PROGRAM: a service **push button** used to upgrade the firmware via the USB port. Pressing this button at power ON or under power for more than 5 sec will initiate a point-to-point connection. This port is used to set the # of the drive(s) and their PROFIBUS address.

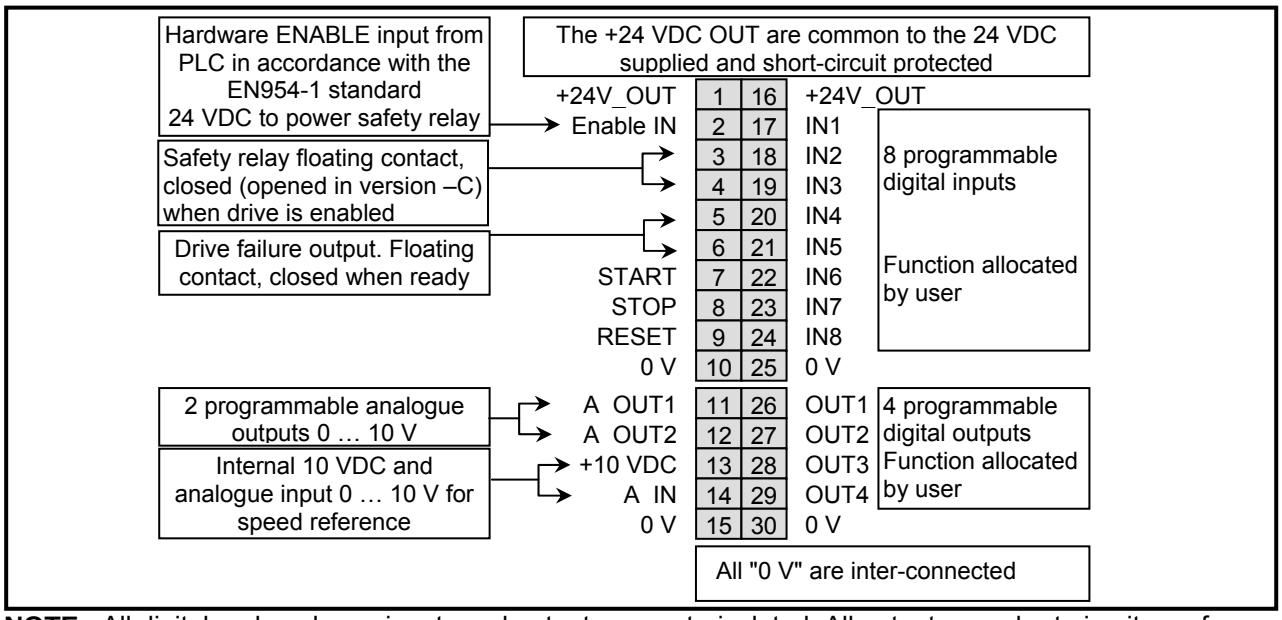
PROFIBUS D-sub 9 poles connector.
This field bus is an option, not to be retrofit in the field. Ask for the specific user manual.

SENSOR input for speed feedback.
TTL encoder or magneto-resistive sensor

Removable **CONTROL TERMINALS**
See "Description of the control terminals X2"



Description of the control terminals X1


Hardware ENABLE input from PLC in accordance with the EN954-1 standard 24 VDC to power safety relay
The +24 VDC OUT are common to the 24 VDC supplied and short-circuit protected
Safety relay floating contact, closed (opened in version –C) when drive is enabled
Drive failure output. Floating contact, closed when ready
8 programmable digital inputs
Function allocated by user
2 programmable analogue outputs 0 … 10 V
Internal 10 VDC and analogue input 0 … 10 V for speed reference
4 programmable digital outputs
Function allocated by user
All "0 V" are inter-connected
+24V_OUT 1 16 +24V_OUT
Enable IN 2 17 IN1
3 18 IN2
4 19 IN3
5 20 IN4
6 21 IN5
START 7 22 IN6
STOP 8 23 IN7
RESET 9 24 IN8
0 V 10 25 0 V
A OUT1 11 26 OUT1
A OUT2 12 27 OUT2
+10 VDC 13 28 OUT3
A IN 14 29 OUT4
0 V 15 30 0 V

NOTE: All digital and analogue inputs and outputs are opto-isolated. All outputs are short-circuit proof.

	#	Name	DESCRIPTION
X1-1	1	24V_OUT	Same potential as the external supplied 24 VDC. Available to activate an input. This output is short circuit protected.
	2	ENABLE	This enable is used in connection with the SAFETY RELATED DRIVE INTERLOCK (called SAFE INTERLOCK in the chapter “The start options”). Apply 24 VDC to activate.
	3	EN_A	This NO or NC (version –C) relay contact will close when the "ENABLE" is powered.
	4	EN_A	This relay contact is potential free. Max contact load 230VAC /2A or 24VDC/2A
	5	DR_R	This NO relay potential free contact will close when the drive is READY resp. the relay energized, The contact will be open in case of FAILURE. Maximal contact load 125VAC/0.6A resp. 30VDC/2A or 110VDC/0.6A
	6	DR_R	
	7	START	Apply 24 VDC to START the drive. For detailed information, see chapter “The start options”
	8	STOP	The drive will STOP when the 24 VDC **is not applied** to this input. For detailed information, see chapter “The start options” NOTE: the 24 VDC must be applied at least 10 ms **before** the START signal, if not a **failure** will be generated. **NEVER** apply both (STAR and STOP) at the same time.
	9	RESET	Apply 24 VDC to reset. Need always to be done after a failure. **Don't apply** a permanent 24 VDC as the reset is triggered by the positive edge of the signal. Min. duration of the pulse: 5 ms
	10	0 V	Electronic ground of the drive, linked to the 0 V of the external 24 VDC

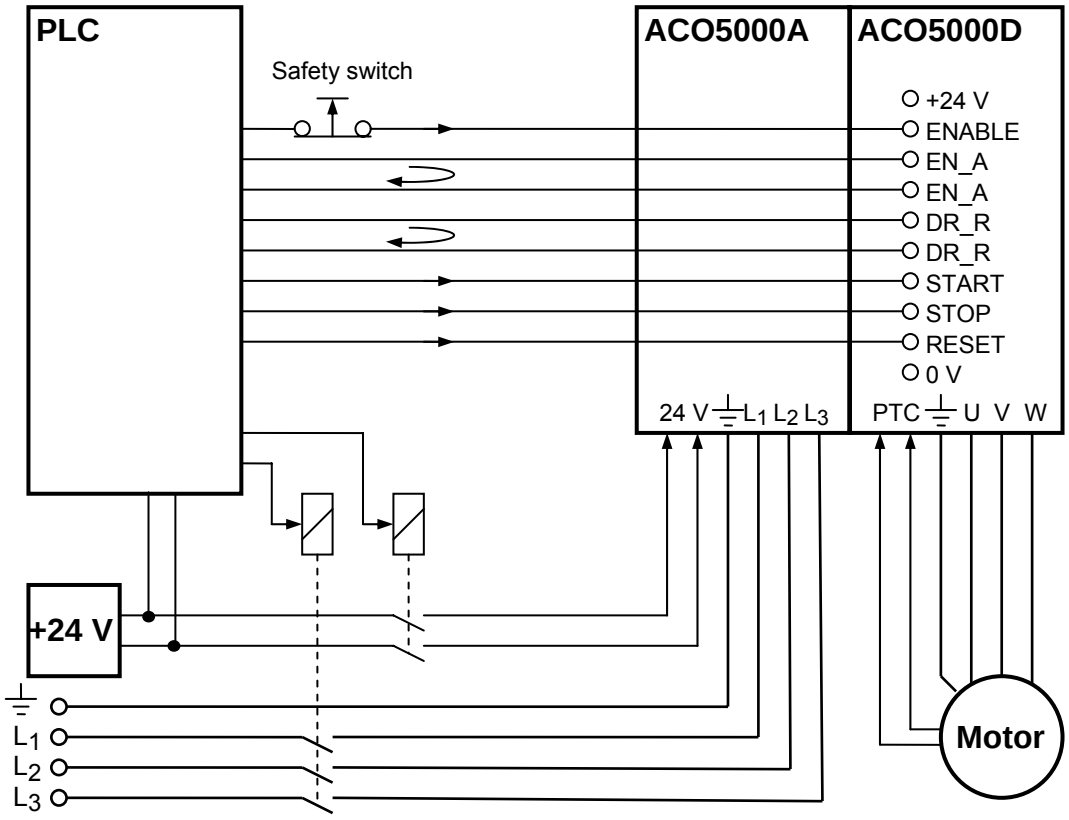
X1-2	11	A_OUT1	2 free programmable 0 to 10 V analogue outputs. Allocated parameters selected by program. Refer to 0 V, terminal X1-2/15. Max. load 10 mA, short-circuit proof.
	12	A_OUT2	
	13	+ 10 VDC	Available to connect a potentiometer between +10VDC (X1-2/13) and 0V (X1-2/15), with the cursor to the input A_IN (X1-2/14) to make a manual analogue speed reference. Use a 10 kΩ potentiometer.
	14	A_IN	Analogue speed reference input 0 to 10 V, referred to 0 V (X1-2/15)
	15	0 V	Electronic ground of the drive, linked to the 0 V of the external 24 VDC

	#	Name	DESCRIPTION
X1-3	16	24V_OUT	Same potential as the external supplied 24 VDC. Available to activate an input
	17	IN1	8 programmable digital inputs Function allocated by user All inputs are opto-isolated Insulated type 24 VDC VOFF [VDC] -0.3 - 5.0 @ 1 mA (max) VON [VDC] 15 - 30 @ 10 mA (typical)
	18	IN2	
	19	IN3	
	20	IN4	
	21	IN5	
	22	IN6	
	23	IN7	
	24	IN8	
	25	0 V	Electronic ground of the drive, linked to the 0 V of the external 24 VDC

X1-4	26	OUT1	4 programmable digital outputs, function allocated by user All outputs are opto-isolated, max. load 10 mA, 24 VDC By allocating the output frequency SDIG (6 times the output frequency) to one of these outputs, use a load resistors of max. 3.3 kΩ
	27	OUT2	
	28	OUT3	
	29	OUT4	
	30	0 V	Electronic ground of the drive, linked to the 0 V of the external 24 VDC

Connecting and wiring instructions

The wiring diagram

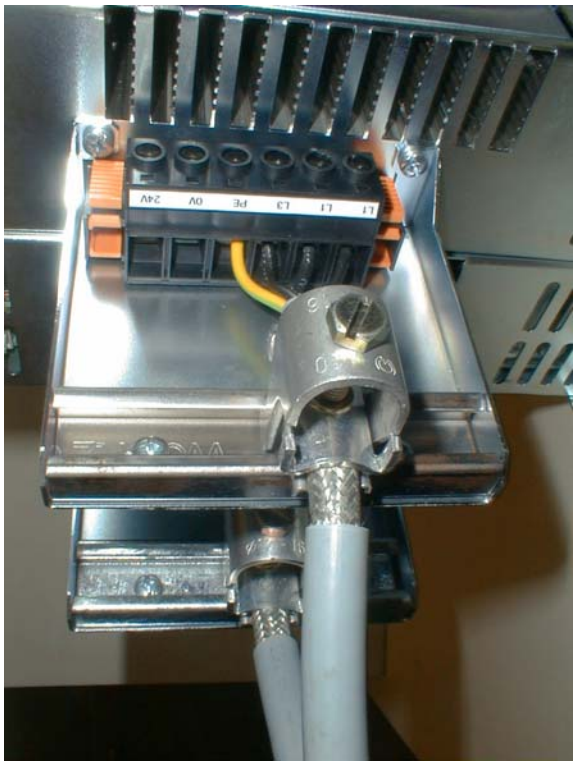


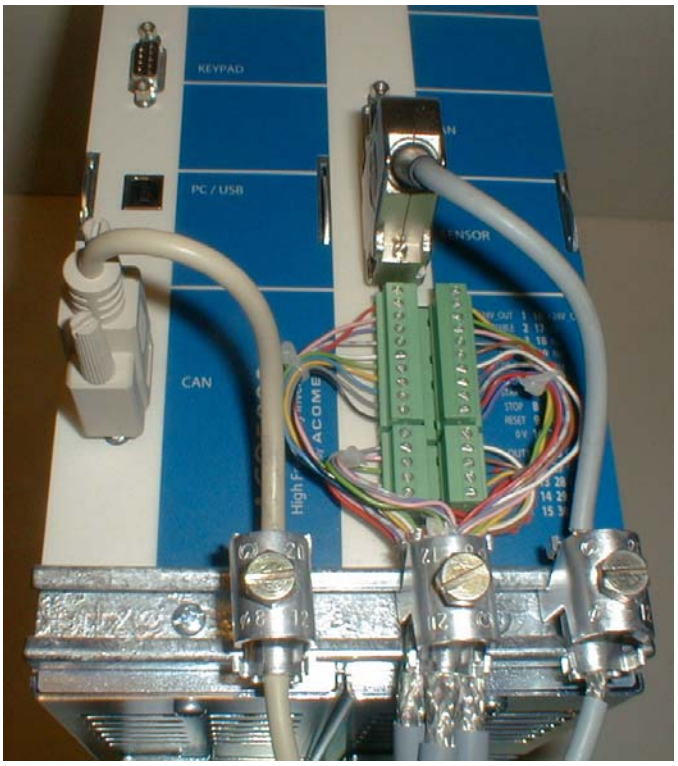
EMC Requirements

Mounting instructions related to the EMC - directive 89/336/EEC

1. The frequency converter must be mounted in a closed metal cabinet.
2. The power connection between converter and motor must be made using shield cables, grounded at both ends.
3. The control connection must utilize shielded cables, grounded on both ends.
4. The shield of the cables must be grounded at both ends.
5. Power connections and control connection must be placed in separated canals.
6. No external filter required.

Connecting the shielding





1. Remove the insulation in the area under the clamping system to get a correct grounding of the shielding.
2. The clamping system has two functions:
   a. Provide for a proper grounding of the shielding.
   b. Provide for a strength relief of the cable, holding it mechanically.

Intended use of operation

The ACO5000 is a variable speed drive whose primary utilization is to drive safely high speed machining spindles. The concept of the drive provides the necessary features to achieve a *Safety related drive interlock* once integrated in the machine with respect to the instruction described in this manual.

The concept of the drive gives the machine manufacturer the choice of the safety level of the operation:

1. According EN954-1, category 3. It is **mandatory** to implement the *safety related drive interlock* as described in this manual. It requires to comply to the following requirements:
   a. Use the ENABLE input
   b. Follow the start sequence procedure as described in this manual to START and STOP the drive.

2. According EN954-1, category 1. In this case you need to:
   a. Put a jumper between the terminal +24V_OUT and the input ENABLE
   b. START and STOP the drive with the corresponding terminal inputs as described in the next chapter.

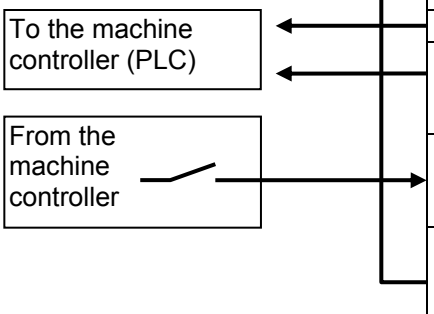
The start options and the wiring diagram to use

This chapter describes various ways or processes to start the drive. It includes 4 subsections:

- The SAFE INTERLOCK feature is not implemented on the machine and the start is using:
  - A permanent contact
  - An impulsion contact
- The SAFE INTERLOCK feature is implemented on the machine and the start is using:
  - A permanent contact
  - An impulsion contact

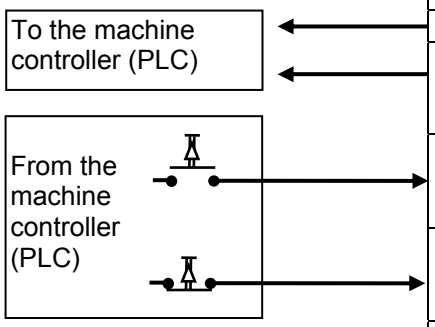
The selection of the start mode using a permanent or an impulsion contact is made by software during the parameterisation of the drive.

No SAFE INTERLOCK, start by permanent contact



#	Name	DESCRIPTION
1	24V_OUT	Same potential as the external supplied 24 VDC.
2	ENABLE	NOT USED Must be connected to 24 VDC via a jumper
3	EN_A	NOT
4	EN_A	USED
5	DR_R	READY Relay output NO potential free contact. Closed when ready Failure when open
6	DR_R	
7	START	Apply 24 VDC to START the drive.
8	STOP	Must be connected to 24 VDC via a jumper. This input has the function of a START enable.
9	RESET	Apply 24 VDC to reset. DON'T use a jumper.
10	0 V	Electronic ground of the drive

No SAFE INTERLOCK, start / stop by impulse contacts



#	Name	DESCRIPTION
1	24V_OUT	Same potential as the external supplied 24 VDC.
2	ENABLE	NOT USED Must be connected to 24 VDC via a jumper
3	EN_A	NOT
4	EN_A	USED
5	DR_R	READY Relay output NO potential free contact. Closed when ready Failure when open
6	DR_R	
7	START	Apply 24 VDC to START the drive. Impulse 5 ms min.
8	STOP	Apply 24 VDC to enable the start Signal interruption 5 ms min. to stop.
9	RESET	Apply 24 VDC to reset. DON'T use a jumper.
10	0 V	Electronic ground of the drive

THE SAFE INTERLOCK PROCEDURE

The safe interlock procedure describes how to control the ACO5000 drive with a PLC to have the maximum safety concerning an unexpected start. It describes the logic concerning all the terminal block signals according to the diagram presented in the last paragraph.
The START and STOP input can be activated by two types of signals. There are permanent signals or impulse signals (duration min. 5 ms in order to avoid unexpected activation by parasitic signal) selected by program (parameter).

Power up procedure

1. Switch on the external +24 V power supply to feed the drive control.
   ENABLE, STOP and START inputs are tied to 0 V.
2. Switch on the main power (400 VAC).
3. Wait until the READY relay close the output DR_R.
   If the drive is in failure mode, it can be removed by the RESET input to let the READY relay be energized.
4. At this point, the drive is in safe interlock mode.

   - It is possible to switch on the external +24 V power supply and the main power at the same time.
   - If the ENABLE input is tied to +24 V before switching on the drive, the safe interlock mode will not be available.
   - If the START input is tied to +24 V before switching on the drive, the start command will not be activated. In this case, it will be necessary to apply 0 V on the START input before applying +24 V again to activate de start command.
   - When the external +24 V power supply is on, if the ENABLE input is activated before the READY relay has closed the output contact DR_R, the drive will go to a failure mode (E4 : Power Fail) and a RESET command will be needed after the closing of the DR_R contact.
   - If the ENABLE input is activated before the main is applied, the drive is going to failure mode (E4 : Power Fail) and a RESET command will be needed after the closing of the DR_R contact.

Procedure to make a START from the safe interlock mode

1. Energized the safety relay by applying +24 V to the ENABLE input.
2. Wait until the safety relay feed-back contact EN_A is closed (open in the case of option –C)
3. Apply +24 V to the STOP input to enable the START input.
4. Wait for min. 10 ms before applying +24 V to the START input.
   In the permanent signals option, maintain +24 V to the START input to keep the START mode.
   In the impulse signals option, a 5 ms pulse is enough to maintain the START mode.
5. At this point, the drive is in START mode and the motor will begin to move.

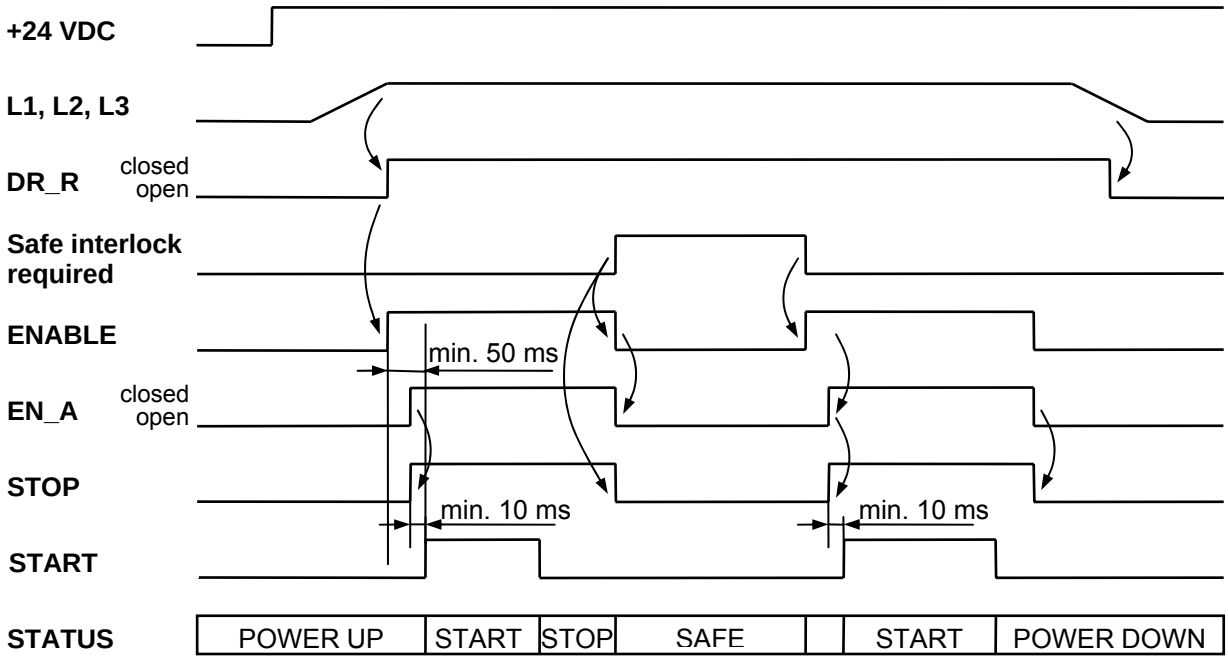
- If the START command is activated before the ENABLE input, the drive will go to a failure mode (E0 : ENABLE) and a RESET command will be needed.
- If +24 V is applied to the START input before or less then 10 ms after the STOP input, the START command will not be activated. It will be necessary to apply 0 V on the START input and do the correct procedure.

Procedure to return to the safe interlock mode

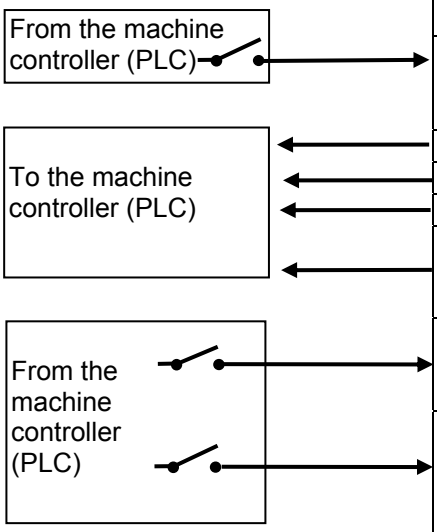
1. Make a STOP and wait until the rotor comes to a standstill.
   (zero frequency signal can be used to know when the motor ends its deceleration)
   In the permanent signals option, apply 0 V to the START input
   In the impulse signals option, apply 0 V to the STOP input for more than 5 ms
2. Apply 0 V to the ENABLE input to release the safety relay.
3. Verify that the feed-back contact EN_A is open (standard version shown on the graphs below)
4. At this point the drive is in the safe interlock mode.

If the safety relay is released by applying 0 V to the ENABLE input before the STOP operation were completed, the motor will run in free-wheel.

Timing for the safe interlock procedure with permanent signals for the START and STOP

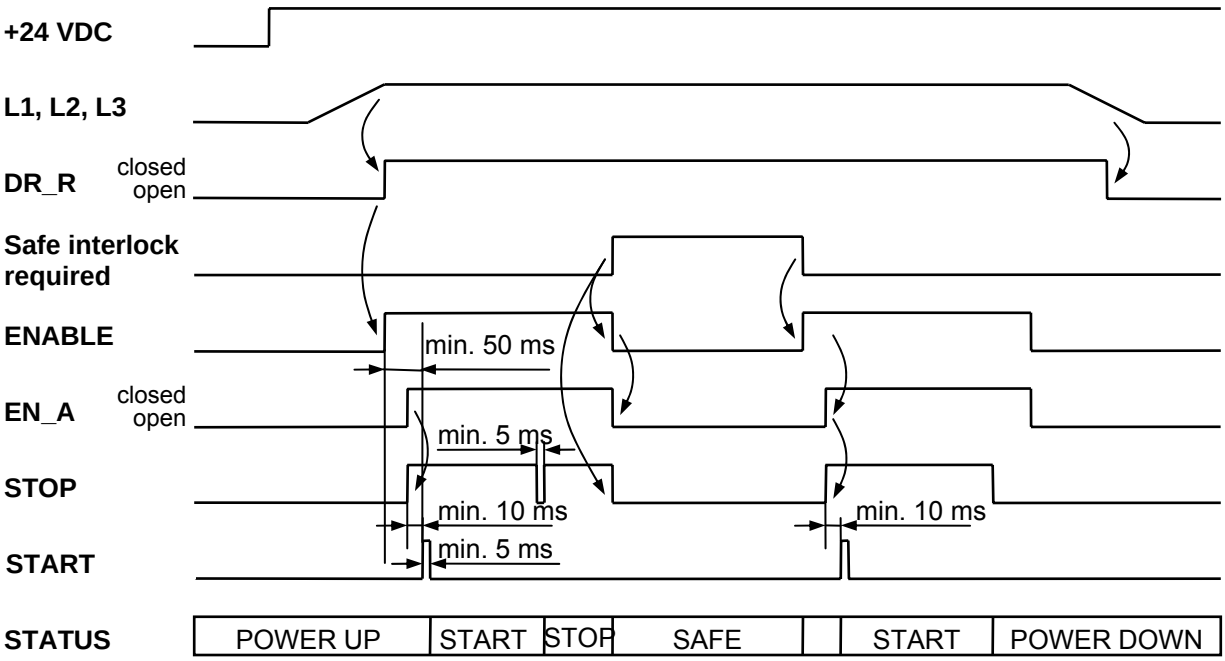


SAFE INTERLOCK implemented, start by permanent contact

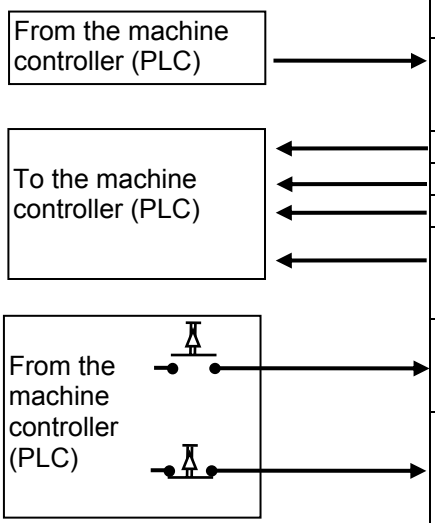


#	Name	DESCRIPTION
1	24V_OUT	NOT TO BE USED when the SAFE INTERLOCK is active.
2	ENABLE	Signal is delivered by the PLC only after reception of the READY signal / terminals 5-6 DR_R
3	EN_A	Confirmation back to the PLC that the ENABLE has been activated.
4	EN_A	
5	DR_R	READY Relay output NO potential free contact. Closed when ready Failure when open
6	DR_R	
7	START	Apply 24 VDC to START the drive.
8	STOP	Signal is delivered by the PLC only after the reception of the ENABLE confirmation / terminals 3-4 EN_A. This input has the function of a START enable.
9	RESET	Apply 24 VDC to reset. DON'T use a jumper.
10	0 V	Electronic ground of the drive

Timing for the safe interlock procedure with impulse signals for the START and the STOP



SAFE INTERLOCK implemented, start / stop by impulse contacts



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7	START	Apply 24 VDC to START the drive.
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9	RESET	Apply 24 VDC to reset. DON'T use a jumper.
10	0 V	Electronic ground of the drive

Instruction to the product integrator

The safe interlock according EN954-1, category 3 is only provided if:

- The sequence of signals according to the safe interlock procedure is respected. If ignored, the safe interlock function is no more achieved.
- The mounting instructions of the user manual are respected.
- The external connections are made according to the proposed wiring diagram.

Additional information to the machine manufacturer

- The recommendations of the machine directives are respected.
- A corresponding risk analysis of the complete machine has been done.

The safe interlock function is a feature to allow the product integrators to satisfy the requirement of the standards to secure a safe interlock of the drive and its connected motor.

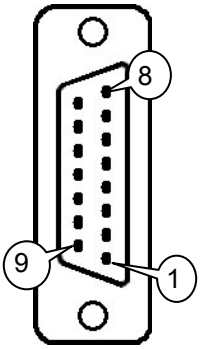
Connecting cables to the ENABLE, STOP and START inputs

Those connecting cables have to comply with the requirement of the table D.5 of ISO13849-2. The elimination of the risk that short-circuits would lead to an unexpected start of the drive (reducing the number of safety barriers) is valid under following considerations:

- Cables must be protected against external damages (i.e use of cable channel, protective tubes) or,
- The above signals are located in separate cables.

Connections outside of our drive are the responsibility of the machine manufacturer.

Sensor input

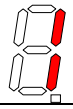
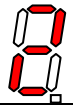
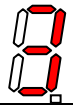
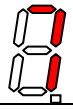
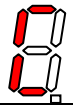
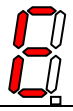
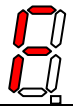


1	Sensor detect +5 VDC	9	RESERVED
2	NA	10	RESERVED
3	RESERVED	11	RESERVED
4	Input magneto-resistive sensor	12	INDEX -
5	INDEX +	13	Channel B -
6	Channel B +	14	Channel A -
7	Channel A +	15	+ 5 VDC power supply sensor
8	Ground 0 V	The case must be connected to earth	
The sensor input accept either 5 V TTL encoder signals or the signal from a magneto-resistive sensor (Siemens – FP210 D 250-22 or FP212 D 250-22) Fmax: > 2MHz			

7 Segments display

	The drive is in STOP mode
	START mode: the segment is rotating clockwise or counter-clockwise according to the direction of the rotation of the motor
	E flashing indicates a failure. The display will show alternatively an "E" and an alphanumeric character indicating the type of failure. For detail see paragraph "Codification of failure"
	Intermediate DC bus voltage > 50 VDC
	Indicate that the DC current braking is active (FCC)
	Indicate that the permanent DC braking current is active (FCP)
	The dot indicates that the serial connection via USB port is active point-to-point with this drive. This mode is activated by pressing the push button PROGRAM during more than 5 s.

Codification of failure

		Enable not released. This error is displayed when a START is given before the ENABLE has been released
		Converter overload.
		Short-circuit to ground
		Over voltage on intermediate DC-Bus. Indicate a voltage surge on the DC-bus exceeding 900 DC peak. This peak could come from the mains or back from the motor.
		Power fails. Will be shown when the ENABLE is activated and the AC voltage is missing.
		Auxiliary power supply failures. Indicates that one of the auxiliary voltages ± 15 VDC or 5 VDC is missing or +24VDC<20VDC
		External interlock is open
		Motor temperature too high (PTC)
		Converter temperature too high (NTC)
		Klixon contact open. Indicate that the temperature of the external braking resistor is too high or that this external module has been removed and the safety jumper not put in place.
		Motor overload, i.e. $I_m > I_{ref}$
		Regen/Accel: this indicates that the dynamic braking process has been activated during the acceleration. A START was probably activated when the motor was still spinning.
		Not allocated
		Not allocated
		Not allocated
		Not allocated

DECLARATION OF CONFORMITY

CE

We: **Danaher Motion S.A**
La Pierreire 2
CH - 1029 Villars-Ste-Croix

declare under our sole responsibility that the products of the family **ACO5000,** are exclusively designed for incorporation in an other machine. The operation of the product is submitted to the conformity of the complete equipment, following the provisions of the directive **98/37/EC**

The conformity of the above specified products with the provisions of the Directive **73/23/EEC** is supported by the respect of the standards **CEI/IEC 1010-1**

If the mounting and connecting instructions of the installation's manual have been respected, this product will be conform to the standards EN 61000-6-4, EN 61000-6-2 and EN61800-3 +A11 relating to the EMC directive **89/336/EEC**.

Mounting instructions related to the EMC - directive 89/336/EEC

1. The frequency converter must be mounted in a closed metal cabinet.
2. The power connection between converter and motor must be made using shield cable.
3. The control connection must utilize shielded cables.
4. The shield of the cables must be grounded at both ends.
5. Power connections and control connection must be placed in separated canals.
6. No external input filter is required.

The R&D manager:

André Schwendener

Assistance and Trouble shooting

All our products are manufactured in accordance with an accurate quality process. Before delivery they are checked for many hours under power. The quality system and production process guarantee that all products are shipped free of default.

The respect of the installation procedure describes in this manual and a correct definition of the application should avoid any commissioning problems.

Should you meet some problems during installation or commissioning of the frequency inverter our technical staff are available for assistance. Please contact your local supplier or the local DANAHER-MOTION subsidiary.

Please includes following information:

1. Description of the application
2. Default or problem you met
3. Copy of the programmed parameters
4. Wiring diagram

In case of emergency:

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